ANNUAL REPORT 1965

FORT ERIE

water pollution control plant

TD226 F66 W38 1965 MOE

c.1 a aa AUG 15 1966

DIVISION OF PLANT OPERATIONS

Ontario Water Resources Commission

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ONTARIO WATER RESOURCES COMMISSION

OFFICE OF THE GENERAL MANAGER

Members of the Fort Erie Local Advisory Committee, Town of Fort Erie.

Gentlemen:

I am pleased to provide you with the 1965 Annual Report for the Fort Erie Water Pollution Control Plant, OWRC Project No. 59-S-39.

We appreciate the co-operation you have extended to our Operations staff throughout the year, and trust that continuation of this close association will ensure even greater progress in the sphere of water pollution control.

Yours very truly,

D. S. Caverly,

General Manager.

TD 227 F66 W38 1965 MOE

asxb



ONTARIO WATER RESOURCES COMMISSION

801 BAY STREET TORONTO 5

J. A. VANCE, LL.D. CHAIRMAN

J. H. H. ROOT, M.P.P. VICE-CHAIRMAN D. S. CAVERLY GENERAL MANAGER

W. S. MACDONNELL COMMISSION SECRETARY

General Manager, Ontario Water Resources Commission.

Dear Sir:

I am pleased to provide you with the 1965 Annual Report on the operation of the Fort Erie Water Pollution Control Plant, OWRC Project No. 59-S-39.

The report presents design data, outlines operating problems encountered during the year and summarizes in graphs, charts and tables all significant flow and cost data.

Yours very truly,

B. C. Palmer, P. Eng.,

Director,

Division of Plant Operations.

FOREWORD

This report provides useful information on the operating efficiency of this project during 1965. It is intended to act as a guide in gauging plant performance. To implement that aim, it includes detailed statistical and cost data, a description of the project and a summary of its operation during the year.

Of particular interest will be the cost data, which show the total cost to the municipality and the areas of major expenditure.

The Regional Operations Engineer is primarily responsible for the preparation of the report, and has compiled and arranged the material. He will be pleased to answer any questions regarding it. Other groups, however, were involved in the production, and these include the statistics section, the Drafting Section of the Division of Sanitary Engineering and the Division of Finance.

B. C. Palmer, P. Eng., Director, Division of Plant Operations.

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FORT ERIE

plant pollution control water

operated for

THE TOWN OF FORT ERIE

by the

ONTARIO WATER RESOURCES COMMISSION

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DIVISION OF PLANT OPERATIONS

DIRECTOR: B. C. Palmer

Assistant Director:

C. W. Perry

Regional Supervisor: A. C. Beattie

Operations Engineer:

P. J. Osmond

801 Bay Street

Toronto 5

65 REVIEW

During the past year many of the difficulties which reduced the efficient operation of the plant were overcome. To mention a few, an effective automatic changeover control from natural gas to methane was devised and installed, the megator pump initially supplied for pumping digested sludge was replaced with a Marlow duplex plunger pump, a satisfactory solution was reached concerning the operation and maintenance of the flygt effluent pumps, ozonation equipment coupled with a modification of the exhaust fan and ducting was installed at the pumping station in an effort to eliminate an odour problem.

The operating costs for the year were \$24,836.97 as opposed to \$23,886.73 in 1964. However, the cost per million gallons of sewage treated was down from \$46.57 to \$46.38.

The average daily flow treated by the plant was 1, 47 million gallons or 82% of the plant design dry weather flow of 1, 8 million gallons. The dry weather design flow was exceeded 23% of the time indicating the influence of storm water upon plant flows. This dilution with storm water was also noted in the weak raw sewage.

The plant staff with assistance from OWRC head office staff have been very successful during 1965 in operating an efficient and attractive project. Mr. Ruch and Mr. Brice are to be congratulated for their conscientious and successful efforts.

GLOSSARY

BOD biochemical oxygen demand (a measure of organic

content)

cfm cubic feet per minute

comminution shredding of solids into small fragments

DWF dry weather flow

effluent outflow

flocculation bringing very small particles together to form a larger

mass (the floc) before settling

fps feet per second

gpcd gallons per capita per day

gpm gallons per minute

grit sand, dust, stones, cinders and other heavy inorganic

material

influent inflow

lin. ft. lineal feet

mgd million gallons per day

mlss mixed liquor suspended solids

ppm parts per million

ss suspended solids

TDH total dynamic head (usually refers to pressure on a pump

when it is in operation)

ISTORY 1956 - 1965

In 1956, the Town of Fort Erie and the Ontario Water Resources Commission began discussions on the proposed water pollution control plant. In 1961, the firm of Canadian British Engineering Consultants, Toronto, was engaged to prepare plans and specifications for the project.

APPROVAL

On October 3, 1962, the municipality signed an agreement with the Commission to finance, construct and operate the project.

CONSTRUCTION

Frid Construction Company of Hamilton, Ontario, began construction on October 10, 1962. By October 7, 1963, they had officially completed the job and the Division of Plant Operations undertook the operation of the project.

TOTAL COST

\$806, 282, 81



H. RUCH CHIEF OPERATOR

Project Staff

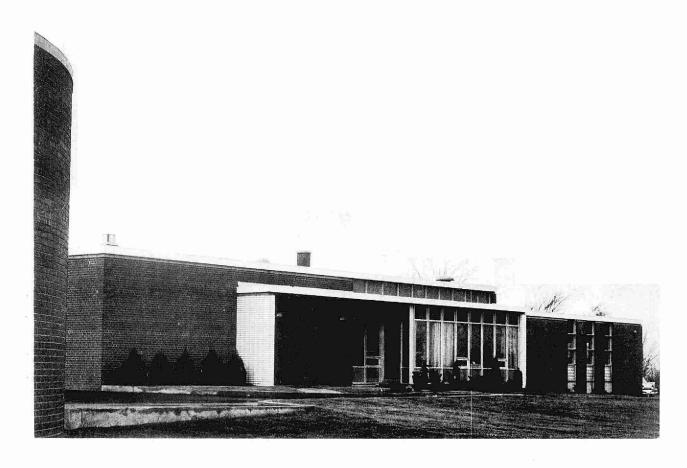
J. Brice, Operator

COMMENTS

The two members of the plant staff provide eight hours supervision of the plant and pumping station on weekdays and partial coverage on weekends. During September 1965, M. Potts resigned his position as operator and was replaced in October by J. Brice.

Casual help is utilized at the plant during the summer months to assist the staff during the holiday period and also for periodic grounds keeping duties.

During 1965 both Mr. Ruch and Mr. Brice successfully completed a maintenance gas fitter's course given by the Department of Energy and Resources. Mr. Ruch also attended the Ontario Water Resources Commission chief operators conference in Toronto during the spring of 1965.



Description of Project

MAIN PUMPING STATION

The main pumping station, located in the Town Park on Niagara Street, receives sewage through a 36-inch diameter trunk sewer. Coarse screens at the entrance to the two wet wells protect the variable speed and the two constant speed pumps from possible damage by removing large solids from the flow.

The three pumps are automatically controlled by a bubbler control system. A 24-inch diameter overflow from one wet well can divert excess flows to the

Niagara River. The sewage is pumped to the treatment plant through an 18-inch diameter forcemain.

SEWAGE TREATMENT PLANT

The primary sewage treatment plant is located just north of the Fort Erie Town limit and about one-quarter mile west of Niagara Street.

INFLUENT WORKS

The flow from the main pumping station is measured just before it enters the

plant by an 18-inch diameter Dall-Tube. The plant flow is diverted through deflector gates to the detritor where dense solids such as sand and grit are removed.

A bypass which can divert the flow to the distribution chamber is provided in case of a breakdown to the detritor.

PRIMARY SEDIMENTATION

The plant flow from the detritor or its bypass enters a distribution box which controls the flow to the two circular settling tanks. Approximately 60% of the suspended solids in the raw sewage are removed in these tanks.

Each tank has a revolving scrapper mechanism which at the bottom of the tank collects the settled sludge and at the top of the tank skims the surface to remove floating material. Both the settled sludge and the removed scum are pumped to the digesters.

The clarified effluent flows over weirs into a channel around the periphery of each tank. These channels discharge into 16-inch diameter pipes which transport the effluent to the chlorine contact chamber.

The settling tanks can be bypassed by diverting the sewage directly from the distribution box to the chlorine contact chamber.

CHLORINATION

The rectangular chlorine contact chamber detains the flow for a sufficient length of time to ensure satisfactory disinfection of the effluent. The chlorine required is introduced automatically at the head of the

chamber by a flow controlled V - notch chlorinator. Chlorine may also be introduced to the plant flow just ahead of the detritor or to the digester supernatant before it is returned to the primary settling tanks.

OUTFALL SEWER

After passing through the contact chamber the plant effluent is discharged to the Niagara River through a 24-inch diameter outfall.

DIGESTION

The digestion at this plant is performed in two stages; called primary and secondary digestion.

The sludge from the settling tanks is pumped to the primary digester. In the absence of air and at a temperature of approximately 90° F. the digestion process is carried out. The organic material in the sludge is broken down by bio-chemical reactions to a more easily de-watered, odourless and, in general, less objectionable material than the raw sludge. Constant mixing in the primary digester ensures uniform digestion.

The secondary digester, which receives the digested sludge is left in a quiescent state to allow thickening to take place. The supernatant is decanted and returned to the treatment process. The thickened digested sludge is pumped from the secondary digester to tank trucks.

During the digestion process, sludge gas (principally methane) is produced. This gas is used as fuel for the boiler which supplies heat to the buildings and digester. Natural gas is used as a standby fuel.

PROJECT COSTS

NET CAPITAL COST (Final)		\$806, 282. 81
DEDUCT - Portion Financed By CMHC (Final)	\$535,794.31	
- Payments from Municipalities	55,000.00	
		590,794.31
Long Term Debt to OWRC		\$215,488.50
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1965		\$ 12, 124. 52
Net Operating		24,836.97
Debt Retirement		4,422.00
Reserve		5,773.79
Interest Charges		12, 174. 21
TOTAL		\$ 47, 206. 97
RESERVE	ACCOUNT	A CONTRACTOR OF THE PARTY OF TH
Balance at January 1, 1965		8,179.21
Deposited by Municipality		5,773.79
Interest Earned		576.38
		14,529.38
Less Expenditures		1,897.83
Balance at December 31, 1965		\$ 12,631.55

MONTHLY OPERATING COSTS

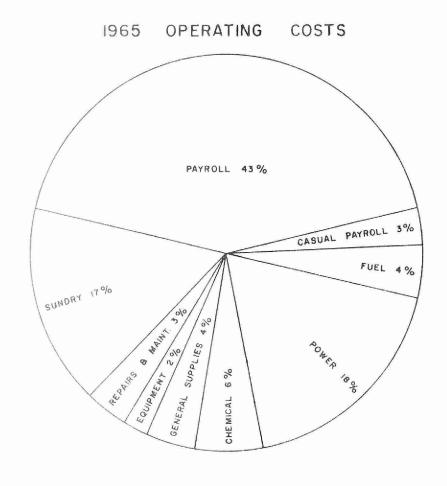
MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS &	* SUNDRY
JAN	866.15	783, 10	9,97				53,62			19.46
FEB	1518.92	783,10		170,38	408,03		69,99			87.42
MARCH	2331.44	783,10	53,88	143,38	415,53	33,99	118.94			7 82 , 62
APRIL	1495.96	884.16	23,63	111.38	387.61		8,00			81.18
MAY	45 15 • 27	1174,65	86,63	112,58	410.78		99,62		132,33	2498,68
JUNE	633 _• 79	803.26	77,00	67,98	322,13	177.68	112.10	8.10	35.04	30.50
JULY	1650,36	954,79	80.03	42,98	347,43		108,37	7 4 , 1 6		42,60
AUG	1926,64	810.48	182,74	37,78	352,34	172,50	82,94	7,11	242,10	38,65
SEPT	2643,28	829,52	159, 15	34,98	385,22	1009.40	107,77	9,02	6,40	101.82
ост	1563,64	966,74	109,74	28,58	372.04		7.04		38,75	40.75
NOV	1816.15	959.30	12.20	71.58	411.59		82,90		157,63	120.95
DEC	2875,37	7 92 , 64		210.96	750.81		176.79	427.90	187,77	328,50
TOTAL	24836.97	10524.84	794,97	1032,56	4563,51	1393,57	1028.08	526.29	800.02	4173,13

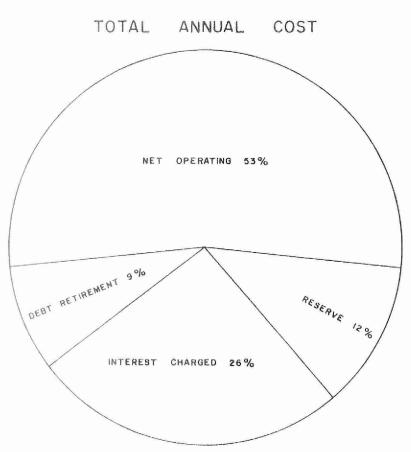
^{*} SUNDRY INCLUDES SLUDGE HAULING COSTS WHICH WERE \$575.12

YEARLY OPERATING COSTS

YEAR	M.G. TREATED	TOTAL COST	COST PER FAMILY PER YEAR	COST PER	COST PER LB. OF BOD REMOVED
1964	512,92	\$23,886.73	* \$10.06	\$46,57	18 CENTS
1965	535,46	\$24,836,97	\$10.49	\$46.38	12 CENTS

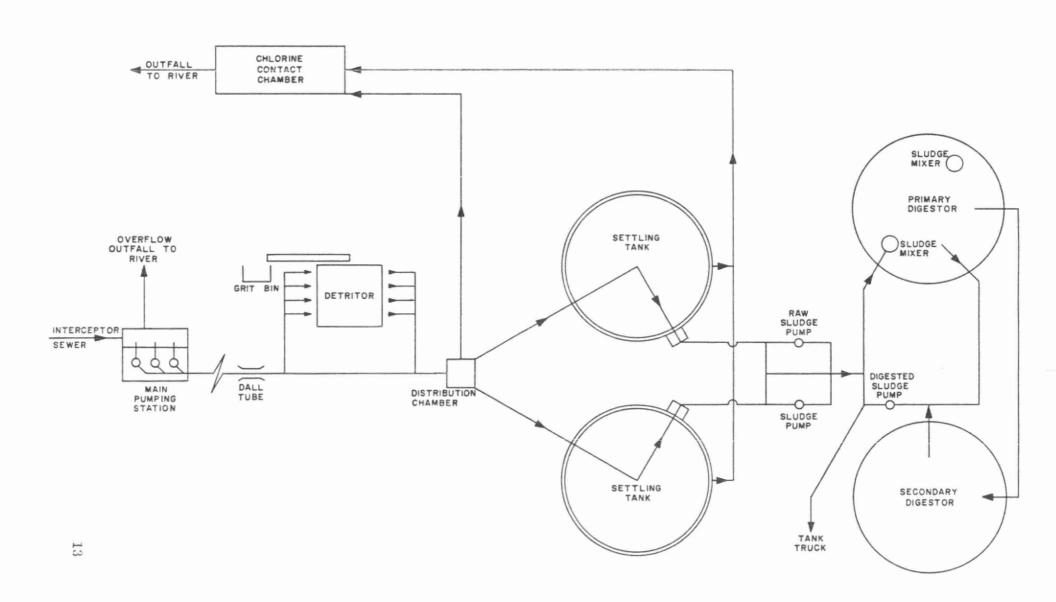
^{*} BASED ON ANNUAL POPULATION ESTIMATE AND 3.9 PERSONS PER FAMILY





Technical Section

FORT ERIE SEWAGE TREATMENT PLANT SIMPLIFIED FLOW CHART



Design-Data

GENERAL

Type of Plant - Primary treatment, two stage digestion, chlorination, liquid sludge haulage.

Design Population - 12,000 persons.

Per Capita Flow - 150 gpd.

Design Plant Flow - 1.8 mgd.

Maximum Flow (2, 5 DWF) - 4.5 mgd.

Five Day BOD

Raw Sewage - 190 ppm

Removal - 40%

Suspended Solids

Raw Sewage - 130 ppm

Removal - 60%

MAIN PUMPING STATION

Inlet - 36" diameter inlet to two wet wells coarse bar screens (2 1/2" bar spacing).

Pumps

No. 1 - Pulsometer vertical spindle sterophagus pump driven by a Westinghouse Type HW variable speed wound rotor electric motor. Maximum capacity 2060 gpm @ 870 rpm and 32' TDH.

No. 2 & 3 - Pulsometer vertical spindle sterophagus pumps driven by Westinghouse constant speed squirrel cage induction motors each with a capacity of 2060 gpm @ 870 rpm and 32¹ TDH.

All three pumps are automatically controlled according to wet well level by a Proportional Bubbltrol Model C-1650-P.

Overflow

24" diameter overflow to Niagara River.

Forcemain

The pumps discharge sewage through 3,325 ft. of 18" diameter forcemain to the treatment plant.

SEWAGE TREATMENT PLANT

Flow Measurement - 18" diameter Dall-Tube inserted in the forcemain, indicating recorder and flow totalizer.

GRIT REMOVAL

One Dorr-Oliver-Long Type WA Detritor with collector mechanism, gritrake and organic return pump.

Dimensions - 12' x 12' x 1.61'.

Volume - 232 cu. ft. or 1445 gallons.

Detention @ 1.8 mgd - 1.15 mins.

Detention @ 4.5 mgd - 0.38 mins.

PRIMARY SETTLING TANKS

Two circular tanks equipped with Link-Belt Type ADB-55 sludge collection mechanisms.

Dimensions - 50' diameter x 10' depth each.

Volume - 39,400 cu. ft. or 245,000 gallons each.

Detention @ 1.8 mgd - 3.27 hours.

Detention @ 4.5 mgd - 1.31 hours.

Surface settling rate @ 1.8 mgd - 458 gallons per sq. ft. per day.

Surface settling rate @ 4.5 mgd - 1140 gallons per sq. ft. per day.

Weir overflow rate @ 1.8 mgd - 5720 gallons per ft. per day.

Weir overflow rate @ 4.5 mgd - 14,300 gallons per ft. per day.

RAW SLUDGE PUMPS

Two Simplex Plunger type sludge pumps Model 800 by R. B. Carter Company each with a capacity of 71 gpm @ 80' TDH.

CHLORINE CONTACT CHAMBER

Dimensions of chamber - $56.25' \times 9.5' \times 5.0'$.

Volume of chamber - 2680 cu. ft. or 16,700 gallons.

Contact period@ 1.8 mgd - 13.4 minutes + outfall.

Contact period@ 4.5 mgd - 5.36 minutes + outfall.

(Outfall contact period is approximately 9.3 minutes at maximum flow).

CHLORINATORS

One Series A711 V-Notch variable orifice Wallace and Tiernan automatically flow controlled chlorinator. Maximum capacity 2000 lbs of chlorine per 24 hours.

Process Water Pumps

Two Type B-80L Flygt electric submersible pumps each capable of 84 gpm @ 125' TDH.

PLANT OUTFALL SEWER

1484' of 24" diameter sewer discharging to the Niagara River.

DIGESTION

Two stage digestion.

Dimensions of primary tank - 39' diameter x 22' sidewall.

Dimensions of secondary tank - 30' diameter x 21.5' sidewall.

Total Volume - 15, 550 + 15, 200 = 30, 750 cu. ft.

Heated Digester Capacity (design) - 1.3 cu. ft. per capita. (Only primary contents heated).

Total Digester Capacity (design) - 2.56 cu. ft. per capita.

Loading (design) - 1.37 lbs solids per cu. ft. per month.

PRIMARY DIGESTION TANK

Fixed steel dome roof.

Two Dorr-Oliver-Long draft tube type circulating mixers.

Pressure relief and flame arrestor assembly.

SECONDARY DIGESTION TANK

Fixed steel dome roof.

Pressure relief and flame arrestor assembly.

SLUDGE HEATING

One Dorr-Oliver-Long Model 25 spiral heat exchanger capable of transferring 200,000 BTUs per hour from the hot water to the sludge at design conditions.

BOILER

One Cleaver-Brooks Model P740-15 forced draft packaged boiler rated at 15 BHP or 500 MBH for hot water at 30 psi designed to operate on either natural gas or sewage gas. This unit supplies hot water to the building heaters as well as the heat exchanger.

Gas Booster Pump

One Roots-Connersville Size 24 Type XA rotary gas booster pump.

Sludge Recirculating Pump

One Smart-Turner sludge recirculating pump capable of 200 gpm @ 16' TDH,

DIGESTED SLUDGE PUMP

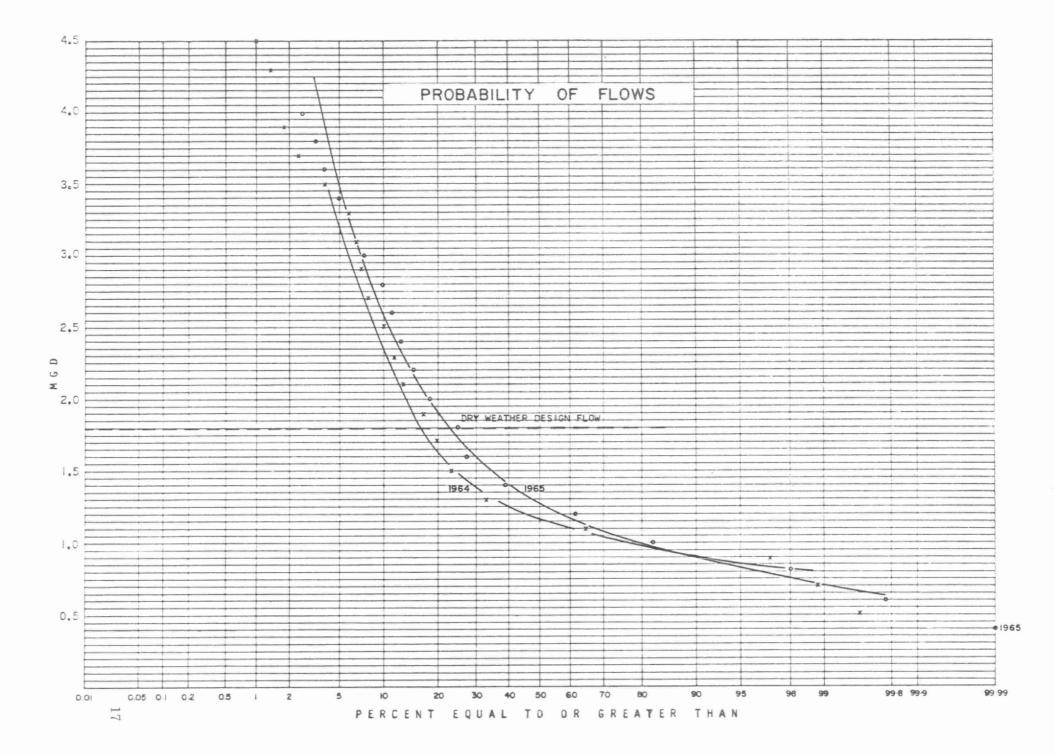
One Marlow type #112 P E duplex plunger pump.

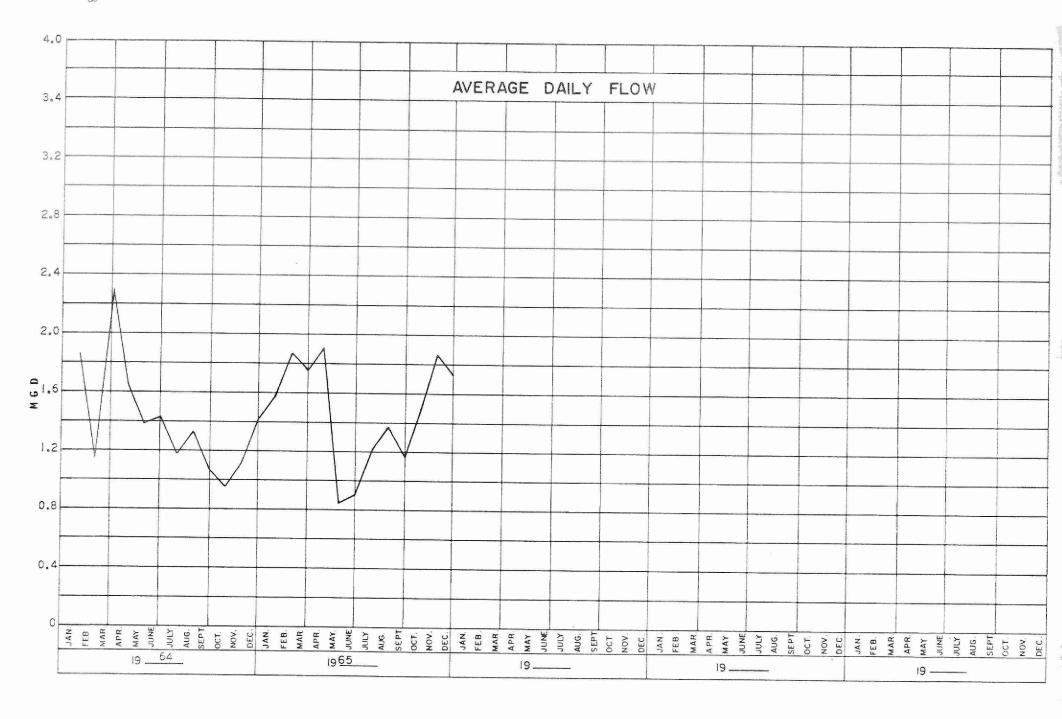
Process Data

A total of 535.46 million gallons of raw sewage were treated at the plant during 1965. This is an increase of 4.4% over the 1964 total flow of 512.92 million gallons. The month of April contributed the highest monthly flow of 57.01 million gallons and May was the lowest with 26.42 million gallons. The highest daily recorded flow was 7.16 million gallons on November 16 and the lowest was 0.5 million gallons on May 16.

The dry weather design flow at the plant was exceeded 23% of the time in 1965 as opposed to 16% of the time in 1964.

The following graphs and charts summarize the 1965 flow data.

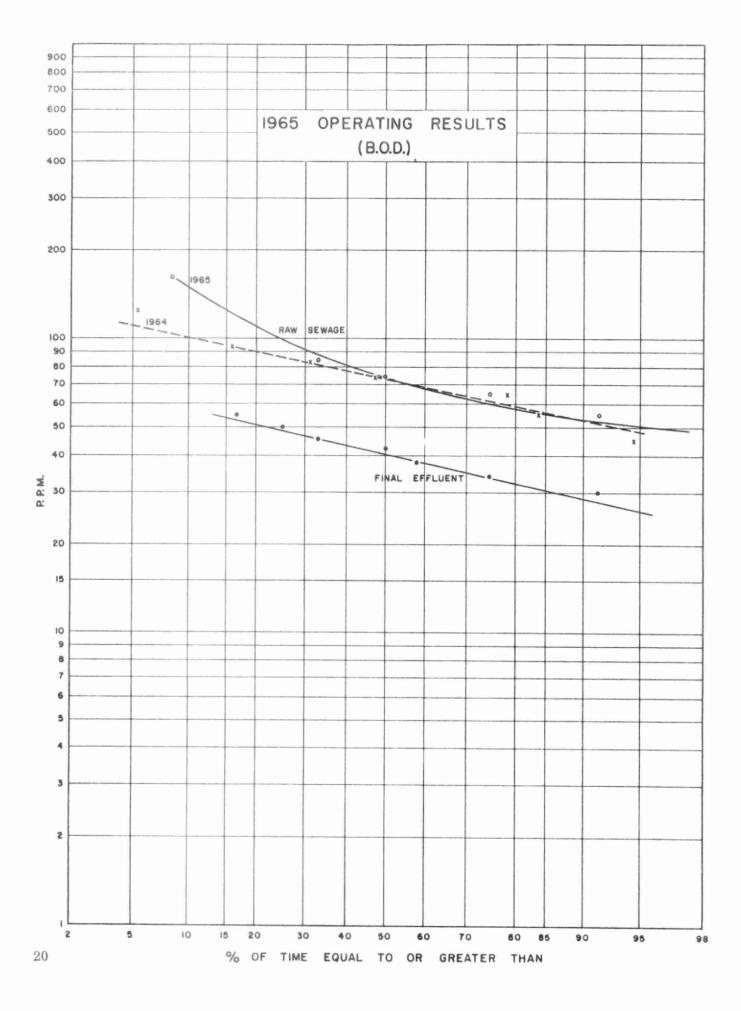


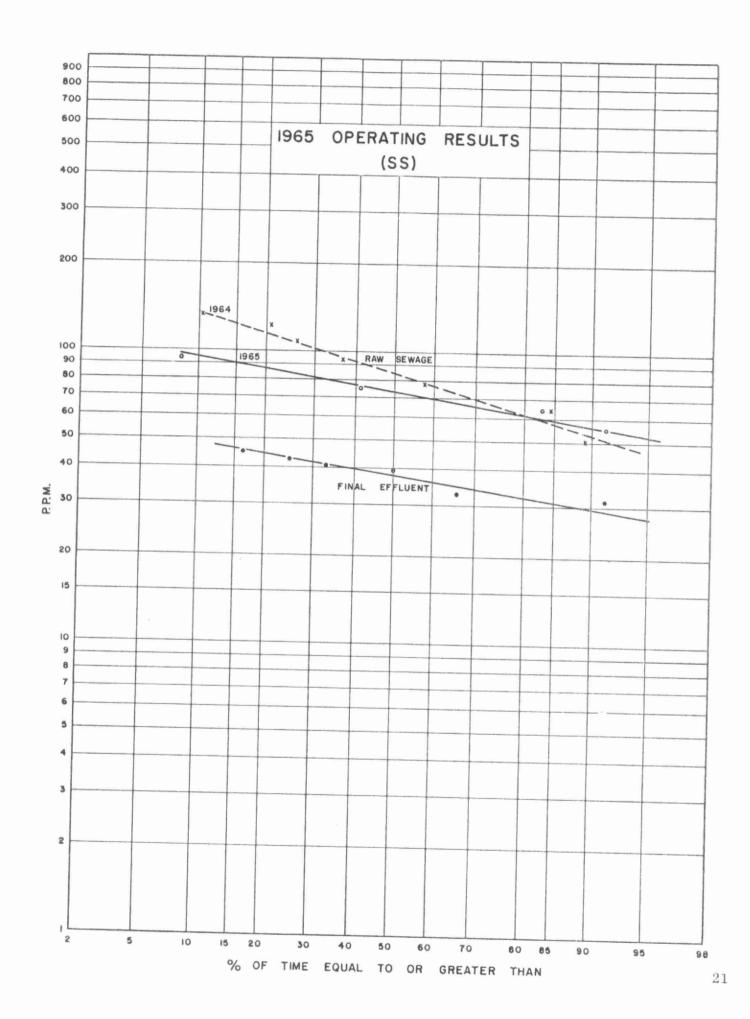


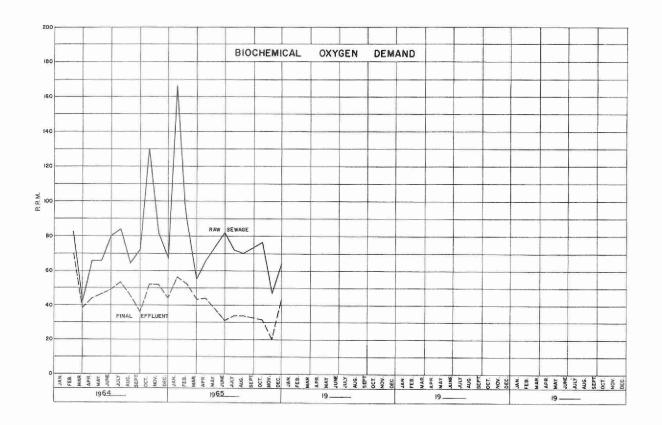
FLOW SUMMARY

Month	Total Flow	Max. 24 hr. Flow MG	Max. Instan. Flow MG	Min. 24 hr. Flow MG
January	48.33	5. 36	6.00	0.78
February	52.35	4. 96	5.60	0.78
March	53. 96	3.32	5.00	1.05
April	*57.01	2.72	5.00	1.31
May	*26.42	1.49	4.60	0.50
June	*27.38	1.39	5.00	0.71
July	*37.11	2.12	7.40	0.89
August	42, 58	2.74	8.00	0.79
September	35.04	3.46	7. 50	0.72
October	46.16	6.14	7.50	0.69
November	55. 87	7. 16	7.50	0.93
December	53, 25	3.50	7.50	0.86
Total	535. 46	une	-	
Average	44.62	3,70	6.38	0.83

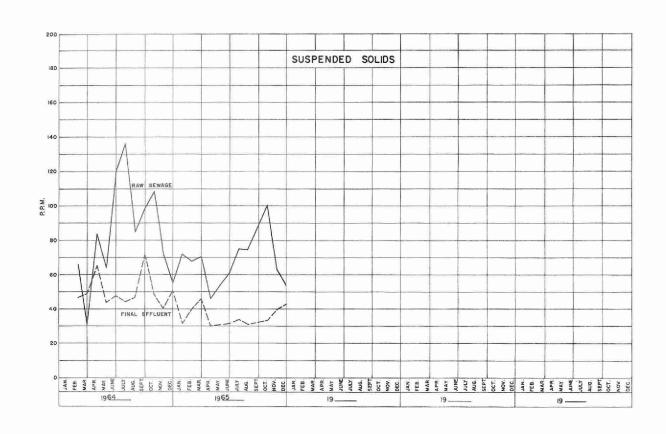
^{*} Partial prorating of data during these months due to meter difficulties.







MONTHLY VARIATIONS



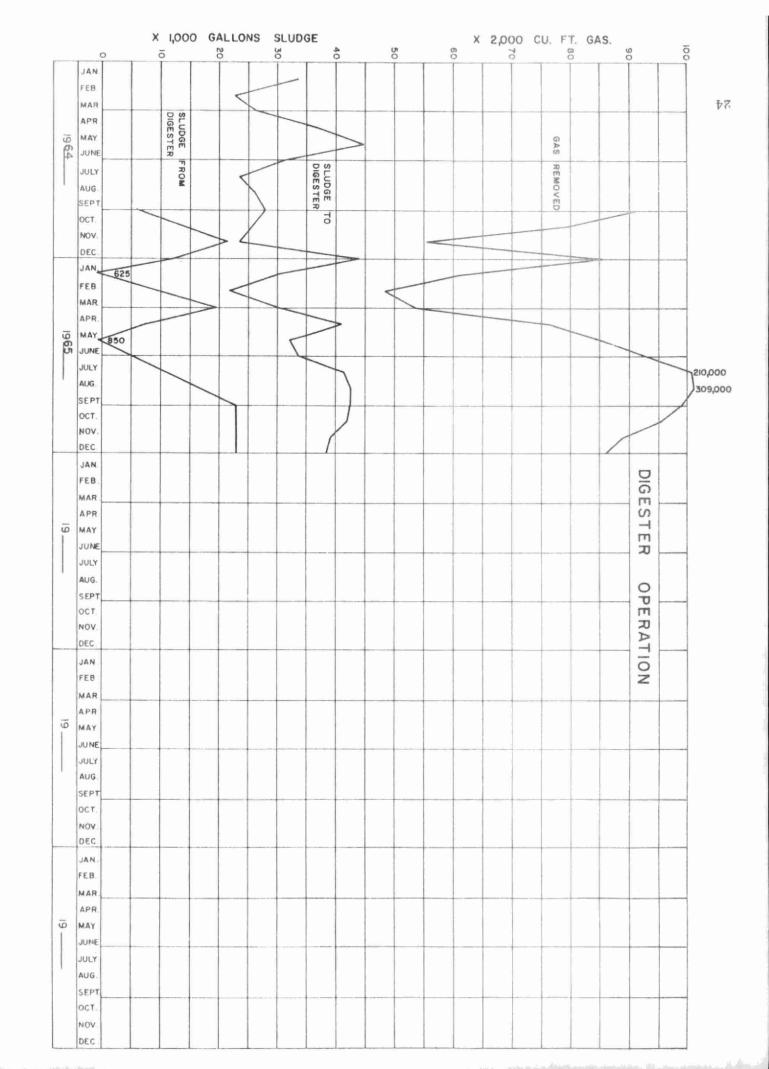
GRIT, B.O.D AND S.S. REMOVAL

		8.	O. D.		S. S.				GRIT
MONTH .	INFLUENT P.P.M.	EFFLUENT P.P.M.	% REDUCTION	TONS REMOVED	INFLUENT PPM.		% REDUCTION	TONS REMOVED	REMOVAL CU. FT.
JAN.	165	56	66.0	26.3	72	32	55,5	9.7	5
FEB.	88	54	38, 5	8.9	68	40	41.0	7.3	7
MAR.	55	43	22, 0	3.2	70	46	34.0	6.5	5
APR.	66	44	33, 3	6, 2	46	30	34.5	2.0	-
MAY	* 78	39	50,0	5, 2	*68	36	47.0	4,2	-
JUNE	82	31	62.0	7.0	61	31	49.0	4.1	1
JULY	72	34	52, 5	7.0	75	34	54.5	7.6	11
AUG.	70	34	51.5	7.7	74	31	58.0	9.2	5
SEPT.	* 78	39	50.0	11.8	*68	36	47.0	5,6	5
ост.	74	32	56, 5	9.7	100	33	67.0	15.5	13
NOV.	47	20	57.5	7.5	63	40	36.5	6.4	12,5
DEC.	64	44	31.0	5, 3	56	43	23.0	3,5	2
TOTAL	-	-	-	104.4	-	_	-	85.7	66, 5
AVG.	78	39	50.0	8.7	68	36	47.0	7.1	5.5

^{*}average values substituted

COMMENTS

The strength of the raw sewage remained as in 1964, well below normally anticipated levels, indicating that there is still considerable dilution occurring. There was an improvement in removal efficiencies with an average 50% reduction in BOD and 47% in SS. Grit quantities removed at the plant were again below normal indicating a relatively low grit content in the sewage. Generally the only time grit is obtained at the plant is during high storm flows.



DIGESTER OPERATION

	SLUDG	GE TO DIGEST	ERS	SLUDG	E FROM DIGES	TERS	
MONTH	1000'S CU.FT.	% SOLIDS	% VOL. MAT.	1000'S CU.FT.	% SOLIDS	% VOL. MAT	GAS PRODUCED 1000'S Cu. Ft.
JAN	4.87	6.49	-	0.10	-	-	123.00
FEB.	3.59	5. 13	-	-	-	-	97.10
MAR.	4.84	6, 35	-	3.13	7- 1	- II	107.40
APR.	6.61	8, 29	4.08	1, 23	10.45	4.99	152, 80
MAY	5.21	7.70	5, 64	0.14	-	-	170.50
JUNE	5.40	7.38	3, 91	-	7.00	-	186.00
JULY	6.64	7.90	-	-	_	-	210.00
AUG.	6,85	8, 57	5.16	-	9.80	4.28	309.00
SEPT.	6.86	8.87	_	-	12.03	_	198.00
OCT.	6.73	5.60	4.06	3,68	9.12	3,35	191.00
NOV.	6, 29	9.50	7.67	-	7.15	4.81	178.00
DEC	6.20	8.22	4.70	-	9.45	4.91	172.00
TOTAL	70.09	_	-	8.28	-		2094.80
AVG.	5.84	7.50	5, 03	1. 65	9, 29	4.47	174.57

COMMENTS

The year 1965 saw a much improved digester management program which is borne out by the figures in the above chart. There was a 22% increase in raw sludge pumped to the digester at a very satisfactory average solids content of 7.5%. Due partly to the large storage area available in the digesters and in part to a return of good quality supernatant to the plant it was only necessary to haul 8280 cubic feet of secondary digested sludge in the past year. There was a large increase in gas production in August due to the break-up of the scum blanket in the primary digester. This was accomplished by the staff using compressed air.

CHLORINATION

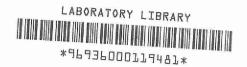
	is and hard name and part . To be med and window the degree sale with	Pounds of	Chlorine Us	e d
Month	Flow	Influent	Effluent	Total
January	48.33	268	-	268
February	52.35	194	-	194
March	53.96	210	_	210
April	57.01	176	-	176
May	26.42	274	395*	669
June	27.38	427	1281	1708
July	37.11	630	1870	2500
August	42.58	686	2058	2744
September	35.04	578	1734	2312
October	46.16	614	1002**	1616
November	55, 87	56	-	56
December	53, 25	-	-	-
Total	535, 46	4113	8340	12453
Average	44.62	374	1390	1132

^{* 10} days chlorination

COMMENTS

Chlorine is added to the effluent from May 15 to October 15 and a 15 minute residual of 0.5 ppm is maintained. The chlorine dosage is automatically controlled in direct relation to plant flow. Influent chlorination was practiced for odour control from January to November. A decision to terminate influent chlorination was made in November. This decision will remain in force as long as odours in the detritor room do not create a nuisance situation.

^{** 16} days chlorination



CONCLUSIONS

The past year was one which saw the end of a great majority of the inevitable deficiencies which occur in the startup of a new plant and the beginning of a stable organized operation. It is hoped the coming year will see among other things the end of nuisance odours at the pumping station. There are no unusual operating or maintenance problems anticipated in the imminent future.

RECOMMENDATIONS

It is recommended that the Town of Fort Erie make a diligent effort to reduce the quantity of storm water presently entering the sanitary sewer system.

DATE	DUE	
DAIL		

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Fort Erie water
pollution control plant: asxb
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